

statistics, Mr. Johnstone's severe criticism rather "misses fire" at present, when definite steps have been taken to improve them. It is difficult to see how he can have read the report of the inter-departmental committee of 1902, in which the recommendations for improvement—which have since been largely carried out—were made, and yet say of that report that "it left the question of statistics in almost exactly the same state as it was."

In the second part of this book the life-histories of fishes are dealt with in a chapter of twenty-five pages of large type, and necessarily very briefly. In another chapter, on the metabolism of the sea, an account is given of the work of Hensen and Brandt in regard to the quantitative estimation of the resources of the sea. There are also important and well-reasoned chapters on the impoverishment of the grounds, the destruction of immature fish, and marine pisciculture.

The following contribution to the discussion of that perennial puzzle, "What is over-fishing?" may be worth quoting:—

"If a boat (either steam trawler or smack) catches fewer fish in the course of the year, it can mean nothing else than this, that *on the portion of the sea-bottom swept by her trawl-net there are fewer fish now than was formerly the case*, that is, the density of fish per unit of area in the North Sea fishing grounds is less than it was thirty years ago. This is a real impoverishment of the fishing grounds."

The author sums up the present situation as regards the relation of scientific research to legislation in the following words:—

"It would appear then that we are not yet prepared to give thoroughly convincing reasons for the adoption of legislative restrictions on those modes of fishing in which small fishes are destroyed to a notable extent. At the same time there can be no doubt that what we do know of the life-histories of fishes does justify us in recommending the adoption, as a tentative measure, of some of the remedies proposed—say the imposition of size-limits on the fishes landed in certain districts," &c., but he thinks that on the whole "it is better to press for investigation on a much more adequate scale than has hitherto been contemplated before recommending any drastic change in the fishery laws."

Students of fishery problems will be familiar with most of the arguments and criticisms in this book. These have appeared before in one form or another, but have never been more incisively stated than in the present volume.

AN ENCYCLOPÆDIA OF PHYSICS.

Handbuch der Physik. By Dr. A. Winkelmann. Zweite Auflage. Dritter Band, Erste Hälfte: Wärme, pp. viii + 536; Vierter Band, Zweite Hälfte: Elektrizität und Magnetismus, I., pp. xiv and 385–1014; Sechster Band, Zweite Hälfte: Optik, pp. xii + 1404. Illustrated. (Leipzig: Barth.) Prices 16, 20, and 30 marks.

PORTIONS of the second edition of this well-known handbook have already appeared and been noticed in these columns. The characteristic of the treatise is that each part is written by a specialist

(under the general editorship of Dr. Winkelmann), and consequently it partakes of the nature of an encyclopædia.

In the heat part appear the following sections:—thermometry (Profs. Pernet and Winkelmann); expansion of solid bodies, liquids and gases, thermo-electric and electric resistance, measurement of temperature, specific heat (Winkelmann); thermal radiation and conductivity (Graetz). Throughout there is carried out a very complete system of references to original sources, with critical comments. This is certainly very well done in general; but in the account of constant pressure gas thermometers we look in vain for any reference to the thermometer of Prof. Callendar, and discover no recognition of the work of the same experimentalist in the development of methods of temperature determination based upon the measurement of electrical resistance. We presume that it is intended to recur to this subject in some other portion of this voluminous treatise.

In the electrical part appear the following sections:—electrical conductivity of electrolytes, by Dr. R. Luther; electricity and gases (ionisation and electrification, characteristics of the electrical current, migration of ions, cathode and canal rays, forces on ions, thermal, chemical, and optical actions), by J. Stark; radio-activity, by J. Stark; atmospheric electricity, by H. Gerdien; thermoelectricity, by Dr. F. Braun; thermal effects of currents, by M. Cantor; Pyro- and piezo-electricity, by Dr. F. Pockels; theory of the galvanic cell, by M. Cantor; electrolysis and migration of ions, by R. Luther; electrical endosmose and convection currents, by L. Graetz; galvanic polarisation and accumulators, by M. Cantor.

From this summary it will be seen that many of the sections relate to subjects in which there has been a tremendous amount of work done in recent years. The subject of radio-activity has, indeed, been *originated* since the previous edition appeared, and so rapidly is progress taking place in our knowledge of this subject that it may be considered a moot point as to what extent it is advisable to introduce such quickly changing matter into a volume which has the stability that a treatise of this kind necessarily possesses. The references extend into the year 1904; but even so it is impossible to praise this section as representing the present state of knowledge. The best that can be said is that there is not much recorded which is now known to be untrue. We think this is much as it should be. An encyclopædia should contain little which has not been sifted and sifted again until there is little doubt of it being an established fact. To more protean volumes should the task be left of portraying the latest phases of any department of knowledge.

These remarks apply—though perhaps not so completely—to other sections of the volume. The subject-matters happen throughout to be those in connection with which development is now most pronounced; but at the worst we have here a magnificent account of the branches of physics named above.

The optical portion is probably of more stable character than the rest, although here also have

great developments to be recorded. We think that the inclusion of such subjects as photography (fifty-five pages) has helped to swell the volume to unnecessarily large proportions. The technics of a special branch such as this seems scarcely at home in its surroundings. We welcome in particular the articles of Drude on the nature of light, on the theory of light for transparent media at rest, for absorbing media, and, finally, for media in motion.

The book is replete with references to original papers, and may be taken as being as complete a handbook for the professional reader as has yet appeared.

GARDEN-BOTANY.

Hortus Veitchii, a History of the Rise and Progress of the Nurseries of Messrs. James Veitch and Sons, together with an Account of the Botanical Collectors and Hybridists employed by them and a List of the more Remarkable of their Introductions. By James H. Veitch. Pp. 542; illustrated with fifty photogravure plates. (Chelsea: James Veitch and Sons, Ltd., 1906, for private circulation.)

THIS is one of the most sumptuous volumes which have ever emanated from a business house, but if it were simply a business publication it would claim no special notice in these columns. It is, in fact, a most important contribution to the history of horticulture during three-quarters of a century or more, and a valuable work of reference for the systematic botanist and the hybridist. It illustrates in a remarkable degree the service which the enterprise of a great commercial firm is capable of rendering, and in this case has rendered, to botanical science. As the author appropriately says:—"To the representatives seeking unknown plants at one period or another in almost every clime, fortune has not invariably been kind, but the work of such men as Thomas Lobb, William Lobb, the late John Gould Veitch, Charles Maries, and E. H. Wilson has been a gain in every way; whilst the efforts in hybridising and selecting of John Dominy, John Seden, V.M.H., and John Heal, V.M.H., have given a wider interest to all cultivators."

With the history of the firm and its various members as given in the introduction to the present volume we are not here concerned, but we may indicate that it would furnish valuable data for Mr. Galton's science of eugenics. The biographical sketches of the twenty-two travellers employed by the firm are so interesting that we could have wished them longer. Whilst very many of the plants introduced into cultivation by the energy and zeal of these men have proved of first-rate importance from a gardener's point of view, as shown, amongst other things, by the fact that no fewer than 422 plates representing Veitchian introductions have been published in the *Botanical Magazine* under the editorship of the two Hookers and their successor, Sir William Thiselton-Dyer, thousands of herbarium specimens have been generously presented to the national botanical establishments and to individual botanists engaged in the study of particular groups.

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When we come to the section relating to the hybridists who have achieved success in Messrs. Veitch's nursery we are again disposed to regret that fuller details were not given, but in view of the magnitude of the book and the immensity of the task we are by no means surprised that the author has felt it necessary to give indications only. Certain it is that the students of hybridisation, variation, and heredity will find inexhaustible materials for study in the results obtained by Messrs. Veitch. It is a noteworthy fact that at the present time, when orchids are so popular, greater interest is felt in the hybrid "creations," in the production of which John Dominy was the pioneer, than in new introductions. When we read of a thousand pounds and more being paid for one of these specimens we can but regret that orchid lovers do not contribute more to encourage scientific research into the history and nature of the plants in which they take such keen interest. The list of species of orchids introduced by Messrs. Veitch occupies no fewer than forty-seven pages. A large proportion of these were described by Lindley, by Reichenbach, and subsequently by Rolfe, and short descriptions and historical notes are afforded in these pages. Orchid hybrids are treated in like manner, the particulars relating to them filling fifty-seven pages, exclusive of an appendix giving historical details, and occupying six pages of small type. The information here given will be of special value to those engaged in the study of hybridisation.

Space will not allow us to do more than mention the sections relating to stove and greenhouse plants, to which eighty-three pages are devoted, to the various species and hybrids of *Nepenthes*, the ferns, the coniferous trees, the deciduous and evergreen trees and shrubs, the herbaceous plants, the bulbous plants, the *Amaryllis*, the *Begonias*, the greenhouse *Rhododendrons*, the *Streptocarpus*, and, lastly, the fruits and vegetables, all exclusively the result of the enterprise or of the skill of Messrs. Veitch and of their assistants. With such a vast amount of material it is evident that severe compression has had to be effected, but even so the record is a marvellous one. Happily an excellent index is provided.

Throughout it is obvious that great pains have been taken in the preparation of the volume, the solid worth of which is enhanced by the excellent manner in which it has been produced.

OUR BOOK SHELF.

Avogadro and Dalton. The Standing in Chemistry of their Hypotheses. By Dr. Andrew N. Meldrum. Pp. 113. (Edinburgh: W. F. Clay, 1904.) Price 3s. net.

THIS book may be read with interest by all chemists, and with special profit by students who have got into confusion with the difficult piece of chemical history of which it treats.

Dr. Meldrum sets himself to define the true relationship and standing of the hypotheses of Dalton and Avogadro. Prof. Japp, in his preface, states that he has nowhere else seen the true ratiocinative order of precedence of the molecular and atomic hypotheses